

Table S1. WQI of different water sources for the pre and post-monsoon seasons.

Non-Mining Area	Pre-Monsoon Season		Post-Monsoon Season		Source Type
	WQI	Classification	WQI	Classification	
R-1	29.40	Good	33.21	Good	DW
R-2	32.00	Good	70.77	Poor	RW
R-3	39.22	Good	55.85	Poor	DW/TW
R-4	33.17	Good	74.78	Poor	RW
R-5	16.31	Excellent	44.08	Good	RW
R-6	21.27	Excellent	72.00	Poor	TW/HP
R-7	24.02	Excellent	48.20	Good	TW
R-8	31.32	Good	39.19	Good	DW/TW
R-9	17.27	Excellent	33.17	Good	TW
R-10	31.80	Good	71.98	Poor	DW
R-11	31.46	Good	39.14	Good	RW
R-12	32.76	Good	32.34	Good	RW
R-13	29.85	Good	32.99	Good	HP/TW
R-16	13.18	Excellent	47.90	Good	HP
R-17	18.25	Excellent	41.40	Good	HP
R-18	29.27	Good	32.92	Good	RW
R-19	18.61	Excellent	46.89	Good	HP
R-20	17.74	Excellent	54.43	Poor	TW
R-21	30.16	Good	35.50	Good	HP
R-22	27.27	Good	65.35	Poor	HP
R-25	15.99	Excellent	42.18	Good	TW
R-26	17.76	Excellent	26.13	Good	DW
R-27	31.43	Good	47.49	Good	DW
R-28	18.30	Excellent	47.48	Good	DW
R-29	33.47	Good	45.20	Good	RW
R-30	37.22	Good	73.25	Poor	RW
R-31	31.23	Good	31.03	Good	DW
R-32	44.25	Good	45.98	Good	RW
R-33	19.52	Excellent	35.00	Good	TW
R-38	30.64	Good	39.30	Good	DW/HP
R-44	64.80	Poor	42.47	Good	RW
R-45	37.88	Good	68.49	Poor	RW
R-49	18.11	Excellent	-	-	RW
R-50	20.77	Excellent	-	-	DW
Mining Area					
R-14	38.55	Good	81.37	Very Poor	MW
R-15	38.06	Good	65.99	Poor	MW
R-23	37.08	Good	37.87	Good	MW
R-24	32.58	Good	67.55	Poor	MW
R-34	54.84	Poor	73.43	Poor	MW
R-35	51.64	Poor	65.76	Poor	MW
R-36	45.53	Good	50.42	Poor	DW
R-37	22.71	Good	43.74	Good	DW
R-39	35.11	Good	38.49	Good	DW
R-40	52.67	Poor	61.34	Poor	MW
R-41	49.41	Good	66.92	Poor	MW
R-42	248.67	Unfit	156.65	Unfit	MW
R-43	251.69	Unfit	118.15	Unfit	MW
R-46	57.47	Poor	87.11	Very Poor	DW
R-47	88.16	Very Poor	67.79	Poor	MW
R-48	47.43	Good	49.13	Good	MW

Note: RW-River Water, MW- Mine Water, GW- Groundwater, DW- Dug Well, HP- Hand Pump and TW- Tube Well

Table S2. Collin's ratio of different water sources in pre and post-monsoon seasons.

Non-Mining Samples	Pre-Monsoon		Post-Monsoon		Source type
	Collins ratio	Classification	Collins ratio	Classification	
R-1	1.699	Not suitable	1.431	Not suitable	DW
R-2	1.746	Not suitable	1.080	Not suitable	RW
R-3	1.172	Not suitable	1.094	Not suitable	DW/TW
R-4	1.383	Not suitable	0.979	Suitable	RW
R-5	0.975	Suitable	0.978	Suitable	RW
R-6	0.656	Suitable	1.043	Not suitable	TW/HP
R-7	0.460	Suitable	0.887	Suitable	TW
R-8	0.948	Suitable	1.232	Not suitable	DW/TW
R-9	0.532	Suitable	1.024	Not suitable	TW
R-10	2.439	Not suitable	2.120	Not suitable	DW
R-11	1.449	Not suitable	1.125	Not suitable	RW
R-12	1.247	Not suitable	1.257	Not suitable	RW
R-13	0.967	Suitable	0.867	Suitable	HP/TW
R-16	0.462	Suitable	1.170	Not suitable	HP
R-17	0.653	Suitable	0.771	Suitable	HP
R-18	1.443	Not suitable	0.840	Suitable	RW
R-19	0.638	Suitable	1.359	Not suitable	HP
R-20	0.663	Suitable	0.825	Suitable	TW
R-21	0.613	Suitable	0.758	Suitable	HP
R-22	0.692	Suitable	0.860	Suitable	HP
R-25	0.543	Suitable	0.645	Suitable	TW
R-26	0.803	Suitable	2.049	Not suitable	DW
R-27	1.772	Not suitable	1.114	Not suitable	DW
R-28	0.676	Suitable	1.658	Not suitable	DW
R-29	1.453	Not suitable	1.329	Not suitable	RW
R-30	1.636	Not suitable	1.609	Not suitable	RW
R-31	2.441	Not suitable	1.327	Not suitable	DW
R-32	1.898	Not suitable	1.127	Not suitable	RW
R-33	0.683	Suitable	0.924	Suitable	TW
R-38	0.632	Suitable	1.647	Not suitable	DW/HP
R-44	0.035	Suitable	0.125	Suitable	RW
R-45	1.270	Not suitable	1.146	Not suitable	RW
R-49	0.685	Suitable	-	-	RW
R-50	1.160	Suitable	-	-	DW
Mining Samples					
R-14	2.763	Not suitable	2.336	Not suitable	MW
R-15	2.670	Not suitable	2.268	Not suitable	MW
R-23	2.424	Not suitable	1.845	Not suitable	MW
R-24	2.583	Not suitable	2.143	Not suitable	MW
R-34	2.232	Not suitable	1.990	Not suitable	MW
R-35	2.153	Not suitable	1.837	Not suitable	MW
R-36	2.359	Not suitable	1.941	Not suitable	DW
R-37	0.763	Suitable	0.922	Suitable	DW
R-39	0.170	Suitable	1.070	Not suitable	DW
R-40	0.009	Suitable	0.395	Suitable	MW
R-41	0.006	Suitable	0.038	Suitable	MW
R-42	0.001	Suitable	0.091	Suitable	MW
R-43	0.007	Suitable	0.103	Suitable	MW
R-46	4.490	Injurious	1.534	Not suitable	DW
R-47	0.010	Suitable	0.069	Suitable	MW
R-48	0.011	Suitable	0.109	Suitable	MW

Note: RW-River Water, MW- Mine Water, GW- Groundwater, DW- Dug Well, HP- Hand Pump and TW- Tube Well

Table S3. δD , $\delta^{18}O$ and d-excess values for the water samples of the study area.

S.No	Location	Sample Code	Source Type	Lat. (N)	Long. (E)	$\delta^{18}O$	δD	d-excess
1	Gonda	R-1	DW	23.4263	83.0587	-4.21	-32.27	1.42
2	Mahan River S 7	R-2	RW	23.4508	83.0763	0.06	-10.21	-10.70
3	Parvatipur	R-3	DW/TW	23.4392	83.1096	-6.69	-46.11	7.43
4	Mahan River S 6	R-4	RW	23.4372	83.0791	-0.43	-12.80	-9.37
5	Banki River	R-5	RW	23.4176	83.0997	-0.90	-18.39	-11.22
6	Palda	R-6	TW/HP	23.4088	83.0984	-6.37	-43.89	7.08
7	Chhatarpur Para/Patouapara	R-7	TW	23.4111	83.0760	-6.56	-46.14	6.37
8	Bagrd	R-8	DW/TW	23.3710	83.1073	-6.73	-46.11	7.74
9	Dharampur	R-9	TW	23.4055	83.1777	-7.02	-46.82	9.37
10	Maridand	R-10	DW	23.3468	83.1598	-2.38	-26.40	-7.35
11	Mahan River S 2	R-11	RW	23.3340	83.1504	-0.79	-19.30	-12.99
12	Gohangar Nala	R-12	RW	23.3436	83.1709	-0.92	-16.18	-8.86
13	Kotripara	R-13	HP/TW	23.3501	83.2291	-5.90	-42.15	5.07
14	Mahan II Inlet	R-14	MW	23.3611	83.2246	-2.68	-24.82	-3.37
15	Mahan II Outlet	R-15	MW	23.3635	83.2270	-2.80	-34.47	-12.03
16	Choura	R-16	HP	23.3720	83.2279	-6.55	-46.07	6.33
17	Silphili	R-17	HP	23.4190	83.2548	-6.75	-46.53	7.44
18	Mahan River S 1	R-18	RW	23.3253	83.1915	-1.14	-19.00	-9.92
19	Khargawan	R-19	HP	23.3068	83.1924	-6.68	-46.67	6.77
20	Kalyanpur	R-20	TW	23.2432	83.1913	-6.97	-48.96	6.77
21	Karwan	R-21	HP	23.2416	83.0522	-6.50	-45.02	6.95
22	Hiradabri/Maheshpur	R-22	HP	23.2166	83.0704	-6.23	-45.36	4.46
23	Nawapara Inlet	R-23	MW	23.2213	83.0897	-5.67	-41.25	4.09
24	Nawapara Outlet	R-24	MW	23.2213	83.0897	-5.87	-41.24	5.73
25	Latori	R-25	TW	23.2307	83.0952	-6.75	-49.70	4.27

26	Tulsi	R-26	DW	23.2676	83.0997	-6.74	-46.84	7.11
27	Chikni	R-27	DW	23.3075	83.0507	-5.59	-40.14	4.58
28	Bojha	R-28	DW	23.3197	83.1236	-6.53	-45.13	7.07
29	Mahan River S 3	R-29	RW	23.3399	83.1399	-0.61	-17.97	-13.05
30	Banki Nala	R-30	RW	23.3311	83.1385	-1.24	-20.95	-11.01
31	Mayapuri	R-31	DW	23.3456	83.1120	-6.68	-49.34	4.11
32	Galphuli nala	R-32	RW	23.3126	83.1131	5.13	21.85	-19.20
33	Jhigador	R-33	TW	23.3210	83.0872	-6.74	-48.31	5.59
34	Shivani Inlet	R-34	MW	23.3498	83.0745	-5.61	-40.02	4.84
35	Shivani Outlet	R-35	MW	23.3489	83.0744	-5.10	-35.95	4.84
36	Kodasa	R-36	DW	23.3563	83.0635	-5.20	-37.45	4.14
37	Jarhi	R-37	DW	23.3569	83.0381	-6.31	-45.74	4.78
38	Dugga	R-38	DW/HP	23.3518	83.0122	-6.10	-42.79	6.01
39	Bhatgaon	R-39	DW	23.3505	83.0011	-5.24	-39.94	2.00
40	Bhatgaon Inlet	R-40	MW	23.3573	83.0065	-5.57	-41.90	2.68
41	Bhatgaon Outlet	R-41	MW	23.3573	83.0065	-3.60	-32.54	-3.73
42	Mahan 1 Inlet	R-42	MW	23.3840	83.0141	-3.27	-29.93	-3.75
43	Mahan 1 Outlet	R-43	MW	23.3840	83.0141	-1.21	-23.60	-13.93
44	Mashan Nala	R-44	RW	23.3833	83.0500	-2.97	-24.89	-1.11
45	Mahan River S 5	R-45	RW	23.4175	83.0656	-0.56	-15.47	-11.00
46	Pondi	R-46	DW	23.3905	83.0203	-3.99	-39.31	-7.36
47	Mahamaya Inlet	R-47	MW	23.3668	83.0044	-5.63	-48.29	-3.27
48	Mahamaya Outlet	R-48	MW	23.3668	83.0044	-5.63	-47.13	-2.13
49	-	R-49	RW	22.8282	83.3633	-4.98	-47.15	-7.35
50	-	R-50	GW	22.8780	83.2812	-6.18	-51.79	-2.32

Note: RW-River Water, MW- Mine Water, GW- Groundwater, DW- Dug Well, HP- Hand Pump and TW- Tube Well

Table S4. Physico-chemical parameters of various water sources during Pre-monsoon season.

ID	pH	EC	TDS	F ⁻	Cl ⁻	HCO ₃ ⁻	SO ₄ ²⁻	NO ₃ ⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺
R-1	6.84	205	158	0.21	8.9	99	3.08	7.13	13.46	15.87	7.1	2.91
R-2	7.75	220	185	0.23	7.4	102.7	29.21	0.12	20.19	12.06	9.5	3.29
R-3	6.44	139	134	0.36	8.4	65.1	2.89	22.31	13.46	8.36	11.2	1.87
R-4	7.42	270	205	0.24	5.7	82.2	60.29	0.24	25.23	17.75	9.9	3.56
R-5	6.98	137	93	0.06	8.4	51.8	4.63	3.22	10.46	7.35	5.3	1.7
R-6	6.4	69	54	0.13	0.9	38.3	1.62	0	4.46	3.86	1.8	3.12
R-7	5.87	106	69	0.18	5.1	21.5	2.58	21.77	6.73	5.64	4.2	1.34
R-8	6.39	149	100	0.27	7.4	51.8	12.7	0.19	16.82	5.27	3.8	1.87
R-9	6.02	152	92	0.07	16.7	18.1	1.73	30.34	6.73	10.5	5.4	2.06
R-10	7.34	311	236	0.23	15.4	142.9	14.91	0.95	37.01	10.6	10.9	3.38
R-11	7.61	160	126	0.24	3.8	85.5	4.84	0.25	11.77	9.25	7.9	2.49
R-12	7.13	160	116	0.27	5.2	72.1	4.14	3.4	13.46	8.17	6.9	2.01
R-13	6.89	120	92	0.24	4.1	55.2	5.73	1.32	13.46	5.42	4.7	2.09
R-14	7.73	433	341	0.26	6.8	166.5	76.99	2.34	40.37	17.31	23.1	7.32
R-15	7.87	434	339	0.25	10.7	159.7	78.53	2.32	37.01	20.32	23.2	7.15
R-16	5.93	57	41	0.05	3.4	19.8	1.36	6.58	3.87	2.76	1.8	1.09
R-17	6.23	93	59	0.11	8	26.9	5.88	1.97	6.73	3.7	4.2	1.25
R-18	7.36	166	129	0.22	3.5	85.5	4.75	0.5	19.87	5.2	6.8	2.31
R-19	6.12	125	77	0.09	11.2	24.8	0.88	18.9	10.09	3.86	4.4	2.96
R-20	5.9	167	105	0.07	18.8	22.9	0.41	33.72	12.87	5.65	7.5	3.12
R-21	6.2	146	89	0.22	14.8	21.5	1.31	26.89	5.05	8.61	6.5	4.25
R-22	6.25	122	97	0.2	18.9	24.8	2.66	25.96	10.09	7.49	4.8	2.43
R-23	7.61	253	204	0.28	3.7	146.2	6.52	0.98	16.82	17.99	7.2	4.59
R-24	7.64	224	212	0.23	1.7	156.8	7.21	0.09	23.55	13.91	4.6	3.98
R-25	5.85	102	63	0.07	10.1	20.1	4.03	10.54	6.73	5.64	3.35	2.29
R-26	6.18	225	135	0.05	30.2	28.9	2.12	33.98	12.65	11.23	12.2	3.87
R-27	7.3	251	182	0.21	11.5	102.4	0	15.84	28.6	7.93	10.2	4.88
R-28	6.33	84	67	0.09	5	34.8	2.21	7.17	6.73	5.64	3.1	2.68
R-29	7.39	153	129	0.27	4.4	85.5	4.51	0.48	16.82	7.29	7.5	2.67
R-30	7.44	177	145	0.32	9	93.7	5.04	0.23	16.82	8.27	9.5	2.38
R-31	7.47	407	301	0.13	32.8	136.8	12.91	41.58	30.28	15.66	20.7	9.73
R-32	7.31	211	175	0.39	6.1	112.5	10.79	1.42	20.55	10.99	7.9	4.41
R-33	5.98	76	72	0.1	4.3	34.7	0.38	14.58	6.73	3.7	4	3.79
R-34	7.37	293	225	0.51	7	132.8	29.62	1.17	25.23	10.94	12.1	6.05
R-35	7.53	290	229	0.48	7.2	128.5	28.66	0.62	35.32	10.65	13.1	4.41
R-36	7.35	293	251	0.4	8	141	35.42	1.5	31.96	15.61	12.8	4.05
R-37	6.57	105	93	0.11	7.2	38.1	4.67	18.82	10.09	4.6	3.8	5.52
R-38	6.55	59	55	0.27	2.6	34.8	2.26	0.44	6.73	4.67	2.5	1.14
R-39	6.33	538	395	0.24	11.2	8	268.5	5.39	58.9	23.58	13.2	5.61

R-40	4.12	769	511	0.47	3.7	0	364.6	1.72	80.7	38.51	14.1	7.3
R-41	4.09	880	643	0.4	3.2	0	464.1	3.17	102.6	46.63	14.4	8.19
R-42	4.17	2861	2023	2.68	1.5	0	2105. 6	3.35	457.8	160.1	39.92	17.36
R-43	4.04	3859	2679	2.69	16.3	0	2238. 4	29.49	525.7	165.22	37.2	15.32
R-44	4.31	809	655	0.63	8	1.2	476.3	1.31	105.6	40.02	16.28	6.05
R-45	7.33	317	245	0.3	6.2	75.4	97.1	0.18	35.3	16.48	10.1	3.74
R-46	7.47	1351	848	0.42	150.1	250.8	217.0	1.34	92.5	25.53	98.1	12.55
R-47	3.36	1117	848	0.9	6.1	0	642.2	0.51	109.3	64.91	16.2	7.92
R-48	3.33	1125	901	0.35	7.8	0	680.0	0.99	109.3	79.49	15.5	7.21
R-49	6.32	105	65	0.09	2.5	38.2	7.69	0.46	5.05	5.69	2.3	2.76
R-50	7.05	128	99	0.13	2.2	68.7	1.23	0.14	16.82	3.4	5.5	0.98

Table S5. Physico-chemical parameters of various water sources during Post-monsoon season.

ID	pH	EC	TDS	F ⁻	Cl ⁻	HCO ₃ ⁻	SO ₄ ²⁻	NO ₃ ⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺
R-1	6.67	170.5	129.9	0.28	10.23	78.83	5.85	2.84	12.50	7.65	6.45	2.79
R-2	7.75	138.3	104.7	0.77	5.76	59.54	9.56	1.74	10.33	5.18	5.53	2.21
R-3	7.29	130.7	94.0	0.57	10.00	50.54	2.08	2.61	6.76	3.65	10.37	2.97
R-4	7.86	128.3	93.5	0.83	6.00	52.14	3.45	1.73	9.53	4.17	4.43	1.21
R-5	7.82	132.5	104.5	0.42	6.00	50.43	3.13	3.23	7.60	3.55	6.83	1.79
R-6	6.74	137.7	105.5	0.76	6.77	55.44	1.63	4.22	9.61	4.54	4.23	6.02
R-7	6.16	155.7	107.0	0.44	10.00	39.39	3.38	9.34	7.67	3.89	4.53	7.34
R-8	6.90	278.5	172.2	0.28	16.55	60.83	10.35	20.93	12.76	6.76	8.40	8.92
R-9	6.15	145.6	91.0	0.25	13.77	45.76	0.75	24.55	8.86	4.98	8.31	5.85
R-10	7.42	298.0	220.2	0.73	26.00	116.18	16.64	2.34	30.54	6.32	14.56	6.85
R-11	7.22	130.4	97.3	0.36	6.76	60.94	2.71	2.44	9.79	5.14	4.12	1.94
R-12	7.66	195.0	139.9	0.26	8.00	70.36	18.45	3.85	15.01	6.76	6.62	2.02
R-13	6.57	148.4	102.3	0.26	12.00	39.39	2.24	20.78	11.29	4.32	5.12	4.38
R-14	8.06	604.6	365.7	0.78	9.98	140.54	164.49	3.52	49.81	33.59	12.13	9.21
R-15	7.40	513.0	339.0	0.61	8.00	136.09	108.50	2.62	35.26	23.13	16.21	8.56
R-16	6.15	161.2	109.4	0.49	24.00	39.39	2.32	13.73	6.37	5.55	14.12	1.63
R-17	6.08	122.4	79.5	0.38	10.21	30.86	9.53	6.50	6.11	4.23	6.43	4.85
R-18	7.78	118.0	103.2	0.28	6.00	43.52	3.41	1.76	9.37	4.07	3.92	0.89
R-19	6.49	408.0	243.0	0.38	30.23	67.83	23.21	43.21	25.10	9.98	12.19	8.46
R-20	6.03	132.8	84.0	0.55	18.00	25.55	1.33	22.11	8.86	3.75	7.68	4.44
R-21	6.11	89.7	60.4	0.33	9.96	28.02	2.36	4.19	5.86	3.32	3.87	2.79
R-22	6.44	144.2	98.7	0.66	10.21	36.54	3.46	13.05	7.33	3.60	5.72	7.35
R-23	7.21	214.7	166.1	0.31	5.12	109.20	6.41	1.35	15.25	10.12	4.11	4.85
R-24	7.51	232.8	183.2	0.70	6.00	127.20	7.83	1.35	18.87	10.08	5.32	4.54
R-25	5.90	89.3	62.1	0.41	7.32	22.33	0.73	12.42	4.49	2.67	5.27	3.72
R-26	6.75	489.4	311.2	0.07	52.00	104.80	13.15	57.77	28.09	15.26	30.82	9.27
R-27	6.49	287.5	189.1	0.39	26.00	53.61	7.23	57.87	17.75	11.97	9.15	7.23
R-28	6.55	280.3	183.1	0.38	18.00	90.87	4.22	47.33	18.27	10.87	18.60	9.11
R-29	7.80	137.9	121.4	0.43	10.87	70.36	4.28	2.31	12.24	5.32	6.92	2.13
R-30	7.98	188.5	136.8	0.80	10.00	90.58	4.62	1.89	16.21	6.76	7.39	1.78
R-31	6.77	245.6	160.6	0.24	24.00	64.98	4.09	30.23	18.84	7.48	11.23	2.23
R-32	7.64	115.9	95.6	0.44	6.88	60.98	2.49	2.57	10.87	4.53	5.57	2.12
R-33	5.94	108.9	63.6	0.32	10.00	43.54	1.99	17.90	8.82	4.43	6.12	2.32
R-34	7.61	283.2	206.0	0.76	9.66	116.18	28.45	1.78	23.67	9.06	9.32	5.52
R-35	7.80	281.7	195.7	0.65	8.00	107.65	32.58	1.60	23.86	8.17	9.34	6.52
R-36	7.63	286.6	213.8	0.45	10.23	112.54	28.42	2.24	24.08	7.37	11.56	6.43
R-37	6.37	130.7	83.6	0.41	14.00	32.43	3.06	12.11	6.53	3.42	9.56	4.23
R-38	6.19	157.4	95.4	0.37	26.00	36.66	5.43	12.58	4.26	2.53	24.58	2.66
R-39	6.17	276.6	163.1	0.32	36.00	35.42	26.96	30.96	12.54	7.54	22.11	4.94

R-40	5.23	566.2	317.5	0.59	20.00	18.96	183.34	10.71	42.55	23.13	14.87	7.27
R-41	4.02	901.0	371.1	0.66	14.00	0.00	224.71	8.33	63.21	37.74	14.38	8.12
R-42	3.67	2391.0	409.8	1.91	12.00	0.00	291.61	63.63	27.72	10.22	1.69	1.01
R-43	4.20	2052.0	390.5	1.40	16.00	0.00	285.78	38.36	33.42	11.80	2.61	1.16
R-44	4.60	731.0	357.1	0.34	14.00	5.26	214.74	2.33	63.23	36.14	13.70	7.35
R-45	7.79	137.7	106.6	0.75	6.00	62.14	15.87	2.52	8.98	4.23	4.79	1.29
R-46	6.96	613.8	359.7	0.89	84.00	50.77	87.85	25.55	31.73	5.38	63.75	9.77
R-47	3.60	1130.0	271.2	0.79	4.00	0.00	246.05	1.10	8.26	6.87	2.88	1.25
R-48	3.57	1131.0	270.7	0.54	6.00	0.00	244.53	0.96	8.00	6.52	2.90	1.22
